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Competition, market access and economic geography: Structural estimation and predictions for France

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ABSTRACT

This paper evaluates the role of competition and input–output market access in shaping the geography of economic activity. In a first step, we develop a multi-region multi-industry economic geography model under Cournot competition, of which we estimate the parameter values from French data. We then turn to simulations to see whether a core–periphery equilibrium exists, even with strategic interactions among firms. We show that the marginal profits and mark-ups of firms are greater in both core and peripheral regions than in between, due to a subtle interplay between competition and market-access forces. Production is mostly monocentric, however, and profits are higher in the core, which should produce further concentration. We finally show that policy-makers face a difficult trade-off: lowering inter-regional trade costs reduces disparities between regions, but increases intra-regional inequality.

1. Introduction

The interplay between trade costs, increasing returns to scale and market size lies at the heart of the bell-shaped pattern of regional disparities predicted by economic geography (Combes et al., 2008b). The rationale is that the first stage of integration, say declining but still considerable trade costs, magnifies the propensity of firms to concentrate close to rich central markets. Even so, peripheral regions will finally reap the benefits from additional integration – further falls in trade costs – as agglomeration economies are progressively offset by crowding-out effects, namely rising competition, land rents or wages. This paper aims to investigate the empirical relevance of these predictions across French regions. It also evaluates the French policy implications of economic geography for (i) the spatial pattern of regional inequalities, (ii) the relative magnitude of agglomeration and dispersion forces, and (iii) the changes in the spatial distribution of activity sparked by decreasing trade costs.

The empirical implementation of the standard 2-region/2-industry economic geography model is far from trivial. Consider, for instance, the three richest French labor markets: Paris, Lyon, and Marseille.[1] In 1978, these accounted for 11.0%, 3.6% and 1.7% of French total employment respectively. Given the substantial decline in transport costs between these three pairs of areas from 1978 to 1993 – about −35% – the 2×2 economic geography model predicts that, were France to lie on the right-hand side of the bell, Paris should have grown with respect to both Lyon and Marseille, and Lyon relative to Marseille; the opposite holds if France were to lie on the left-hand side of the bell. However, Table 1 shows that, even though the gap between Lyon and Marseille did widen over 1978–1993, those between Paris–Lyon and Paris–Marseille both fell, which is not consistent with any sides of the bell-curve.

In addition to extending the standard 2×2 framework, a number of other aspects are essential in order to put economic geography to the empirical test. First, it is important to account for geography (say, the intermediate position of Lyon relative to Paris and Marseille), as it changes the way in which trade costs affect regional economic patterns. Secondly, the location of areas in the global economy (Paris, Lyon, and Marseille differ in their market access to the 338 other

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[1] The French continental territory is divided into 341 such travel-to-work areas named "zones d'emploi".

Table 1
Real data *vs* the 2-region model: an illustration.

Employment size	1978	1993	Change (%)
Paris relative to Lyon	3.1	2.3	−25.8
Paris relative to Marseille	5.9	5.6	−5.1
Lyon relative to Marseille	1.9	2.4	26.3

French local labor markets, and even more so to the rest of the world) also warrants consideration, as well as their industrial specialization. The empirics of economic geography cannot thus be properly examined without a fully-specified multi-region multi-sector model.

Moreover, for economic geography models to be taken seriously as a policy tool, they have to be extended in three further directions, as recalled by Behrens and Robert-Nicoud (2011):

- First, monopolistic competition continues to be the core-building block of economic geography models, due to analytical convenience. However, there are some well-recognized limitations of the monopolistic competition approach. In models *à la* Fujita et al. (1999) with Dixit–Stiglitz competition, prices and mark-ups do not depend on the number and the location of competitors. In addition, the production scale is the same across firms and does not depend on market size. By contrast, even if pro-competitive effects exist in the monopolistic competition model proposed by Ottaviano et al. (2002), there are no strategic interactions among firms, as in the Dixit-Stiglitz framework. Following a long oligopolistic tradition in spatial economics,[2] recently somewhat neglected,[3] this paper departs from the standard monopolistic competition framework by incorporating strategic interactions among firms into a multi-region multi-sector model of economic geography. In line with Combes (1997), it uses Cournot competition on segmented markets which modifies substantially the interplay between trade costs, market access and activity location across regions and industries, in comparison with monopolistic competition.
- Second, there is an urgency to put numbers on the theory to get a more precise idea of the magnitudes involved in the bell-shape process predicted by economic geography. To this end, serious calibrations and simulations are required. The earliest calibrations, drawn in the context of CGE models, aimed to predict the spatial effects of EU transport networks on the regions that they were likely to interconnect.[4] The recent literature is mostly dedicated to the calibration of multi-regional models *à la* Fujita et al. (1999). In this context, Forslid et al. (2002) confirm the bell-curve for a wide range of European industries. Adding vertical linkages in this setting, Bosker et al. (2010) find that, with interregional labor mobility, lower trade costs may induce full agglomeration in the French capital region, whereas when labor is immobile, a bell-shaped agglomeration pattern results. Bröcker (2005) assesses the spatial and welfare impact of different EU transport policy scenarios, suggesting that infrastructure policies are pro-cohesive and favor balanced polycentric spatial development, while transport-pricing policies are harmful for the periphery.
  By way of contrast, a small number of papers have *econometrically estimated*, rather than calibrated, at least some of the model parameters *before* simulation. There are at least three advantages to doing so. First, the suspicion that parameter values have been chosen in order to produce the desired predictions is less credible under estimation than calibration. Second, estimated values replicate the data better than calibrations, because they are not more or less arbitrarily chosen. Last, structural estimation uses the exact specifications from theory, and may even provide some validation of the model itself. A handful of recent empirical contributions follow this structural line. However, they are all grounded on monopolistic competition *à la* Fujita et al. (1999). Moreover, they mostly all dedicate to the impact of market and supply access on the spatial dispersion of incomes, as first proposed by Hanson (2005) within the US, Redding and Venables (2004) for a sample of OECD and developing countries, and then replicated within Italy (Mion, 2004), Europe (Head and Mayer, 2006), Indonesia (Amiti and Cameron, 2007), or China (Hering and Poncet, 2010).[5]
  This paper contributes to this literature by deriving an estimable structural specification of labor demand from an economic geography setting with strategic interactions. In our model, due to both final and intermediate demand and cost linkages, labor demand in each sector and location is explained by as many variables as there are industries. Each of these industry-specific variables itself depends on a complex set of market access, trade cost and competition interdependencies across regions and industries. Without sectoral data, Redding and Venables (2004) and Hanson (2005) for instance do not consider inter-industry linkages. Consequently, their empirics are based on only a few explanatory variables, yielding aggregate estimates over industries, whereas we have many explanatory variables and therefore (simultaneously) estimate industry-specific parameters. Given endogenous location choices that depend, indirectly, on the local labor demand, we also consider seriously reverse causality issues. To deal with potential omitted variables, we exploit both the spatial and industry dimensions of our panel data. To address circular causation between market access and labor demand, we use time-lagged variables as instruments.
- Thirdly, the iceberg-type modeling of trade costs in monopolistic competition models is also challenged by empiricism. Henceforth, we also depart from previous work in the way we measure trade costs. We assume that these are borne by firms and that they consist of an origin–destination-specific component and an industry-specific shipment factor. Whereas the first is observed and captured in a unique French data set on generalized transport costs, the second results from the structural estimation of labor demand derived from our model.

Henceforth, the main contribution of our paper is to provide further intuition on the balance between agglomeration and dispersion forces in high-dimension economic geography models with strategic interactions among firms. We use our estimated parameters to simulate the distribution of economic activities, market fragmentation, and the determinants of firm location (prices, costs, mark-ups, marginal profits, demand and total profits). Moreover, we simulate the changes in location and spatial concentration resulting from falling trade costs to assess the impact of further integration on regional inequality. We find that, due to strategic interactions, the market power of firms differs across locations: marginal profits and mark-ups are larger in the core (i.e. around Paris) and in the periphery of France rather than in between, due to a subtle interplay between competition and market access. However, production per firm is so strongly monocentric that profits are higher in the core than elsewhere. Therefore, Paris should attract an increasingly large number of firms, despite fiercer competition. Furthermore, decreasing trade costs entail changes in inequality that might potentially differ between and within regions.

The remainder of the paper proceeds as follows. Section 2 describes the model and the derivation of a structurally-estimable specification. Section 3 presents the French data we use and the estimation results. The simulations in Section 4 are designed to illustrate how agglomeration and dispersion forces interact in high-dimension economic geography models; they also evaluate the impact of further integration on equilibrium spatial patterns. Section 5 concludes.

[2] See for instance Fujita and Thisse (2002).
[3] Zhou (2007) and Annicchiarico et al. (forthcoming) are two laudable exceptions.
[4] See for instance Smith and Venables (1988), Haaland and Norman (1992), Gasiorek et al. (1992), and Gasiorek and Venables (1997).
[5] Crozet (2004) provides also quasi-structural estimations of the migrations induced by changes in market access.